

DESCRIPTION OF TWO NEW SPECIES OF THE GENUS *CHAERILUS* SIMON, 1877 (SCORPIONES, CHAERILIDAE) FROM LAOS AND VIETNAM

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Abstract Two new species belonging to the genus *Chaerilus* Simon, 1877, *Chaerilus laotianus* sp. nov. and *Chaerilus vietnamicus* sp. nov., are described from the North Laos and the North of Vietnam. *Chaerilus petzelkai* Kovářik, 2000, originally described from Dong Nai Province in the South Vietnam, is also redescribed based on a series of specimens deposited in the Muséum National d'Histoire Naturelle, Paris.

Key words Chaerilidae, *Chaerilus*, new species, Laos, Vietnam.

1 Introduction

In the Catalog of Scorpions of the World (Fet, 2000), the monotypic family Chaerilidae Pocock, 1893 included 21 species, all belonging to the genus *Chaerilus* Simon, 1877. In a following revision, Kovářik (2000) defined 18 species as valid, and added two more species recently (Kovářik, 2005). The genus *Chaerilus* was originally described and placed in the family Chactidae; subsequently it was moved to its own subfamily Chaerilinae (Chaerilini Pocock, 1893), and placed in the family Iuridae by Pocock (1893). Laurie (1896) moved the subfamily Chaerilinae to the family Buthidae. Kraepelin (1899) raised the subfamily Chaerilinae to the full family rank. Vachon (1963) defined a unique pattern of cheliceral dentition in the Chaerilidae. Subsequently, the same author characterized the unique trichobothrial pattern of the family, defined as Type B, a totally different type from both Buthidae (Type A) and other families (Type C) (Vachon, 1974). The family Chaerilidae is distributed only in South and Southeast Asia. Lamoral (1980) suggested that the ancestors of the chaerilids originated in Pangaeian times as an eastern Laurasian relic that moved into the Oriental Region after the Indian plate connected with Eurasia. They became isolated in the Oriental Region as the Himalayas formed (Sissom, 1990). Santiago Blay *et al.* (2004) described a fossil genus *Electrochaerilus* and subfamily Electrochaerilinae from the Cretaceous amber of Myanmar (Burma).

In Vietnam, several species have been previously cited, but these proved to be misidentifications (Kovářik, 2000). In fact, the only confirmed species from Vietnam is *Chaerilus petzelkai* from the south of the country. This species, although valid, was described on the basis of a single female specimen. In this paper, *C. petzelkai* is redescribed and illustrated based on a large series of

specimens from the collections of the Muséum National d'Histoire Naturelle, Paris, collected by Prof. Constantine Dawydoff (1877-1960) in 1929-1934 and 1938-1939. From these collections, two new species of the genus *Chaerilus* are discovered and described, originated respectively from the North of Laos and the North of Vietnam.

2 Methods and Material

Illustrations and measurements were produced using a Wild M5 stereo microscope with a drawing tube and an ocular micrometer. Measurements followed Stahnke (1970) and are given in micrometer (mm). Trichobothrial notations followed Vachon (1974) and morphological terminology mostly followed Vachon (1952). All the described specimens in the present paper are adults and preserved in 70% ethanol. Depositories: MNHN = Muséum national d'Histoire naturelle, Paris; MHBV = Museum of Hebei University, Baoding, China).

3 Taxonomic Treatment

Chaerilidae Pocock, 1893

Chaerilus Simon, 1877

Chaerilus petzelkai Kovářik, 2000 (Figs. 1-19, 50-53, 60-61, 64, 65)

Chaerilus petzelkai Kovářik, 2000: 48, fig. 8.

Material. Vietnam (label written as Indochina), South Annam, Bana (1500 m), XII/1938 (C. Dawydoff), 1 female; Cauda, 1938-1939 (C. Dawydoff), 1 female; Dong Trang, I/XI/1930 (C. Dawydoff), 1 male, 2 females; Ninhhoa, 1938-1939 (C. Dawydoff), 3 males, 1 female; Pic de Lang-Biang (2000 m), III/1939 (C. Dawydoff) 5 males, 5 females, 2 juveniles; Pic de Lang-Biang (1500 m),

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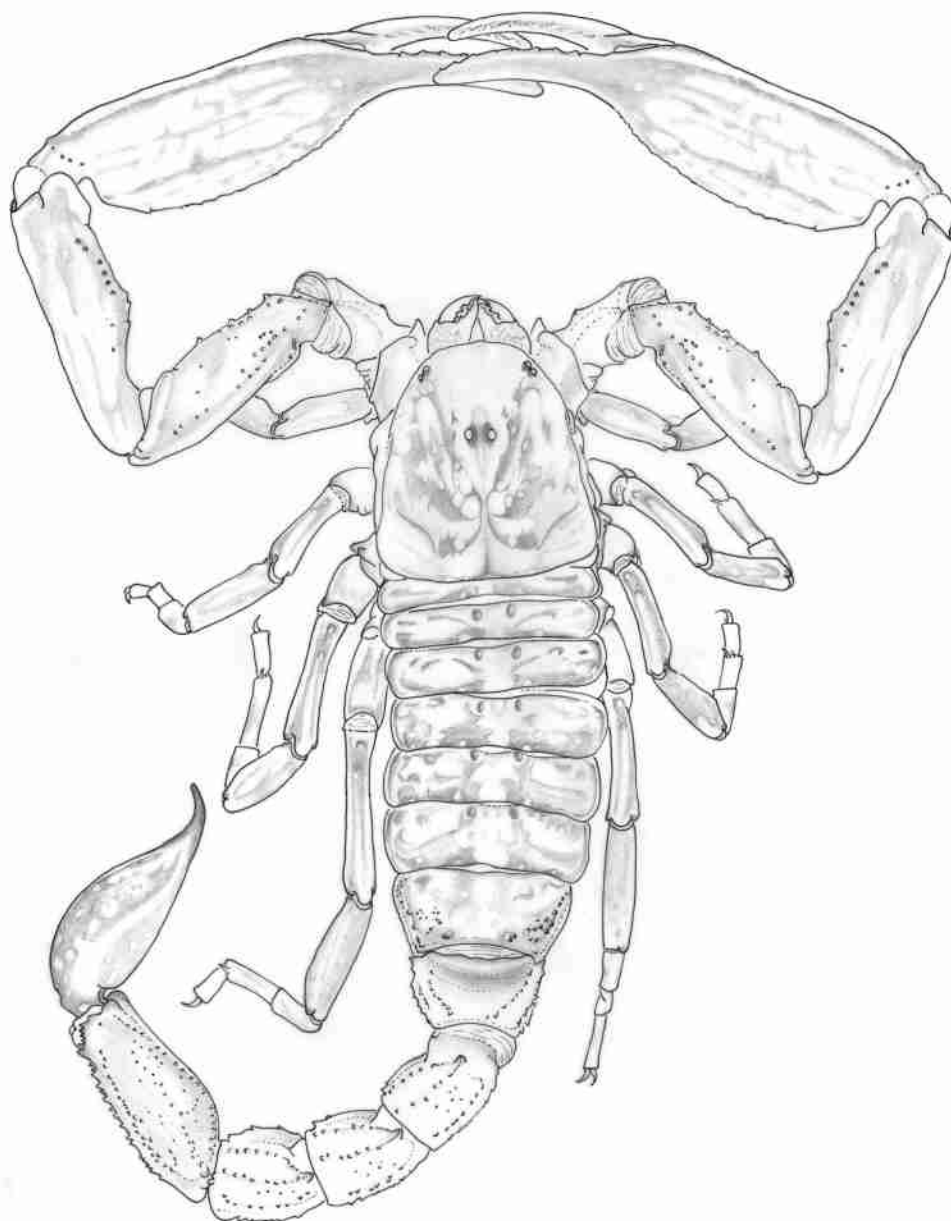


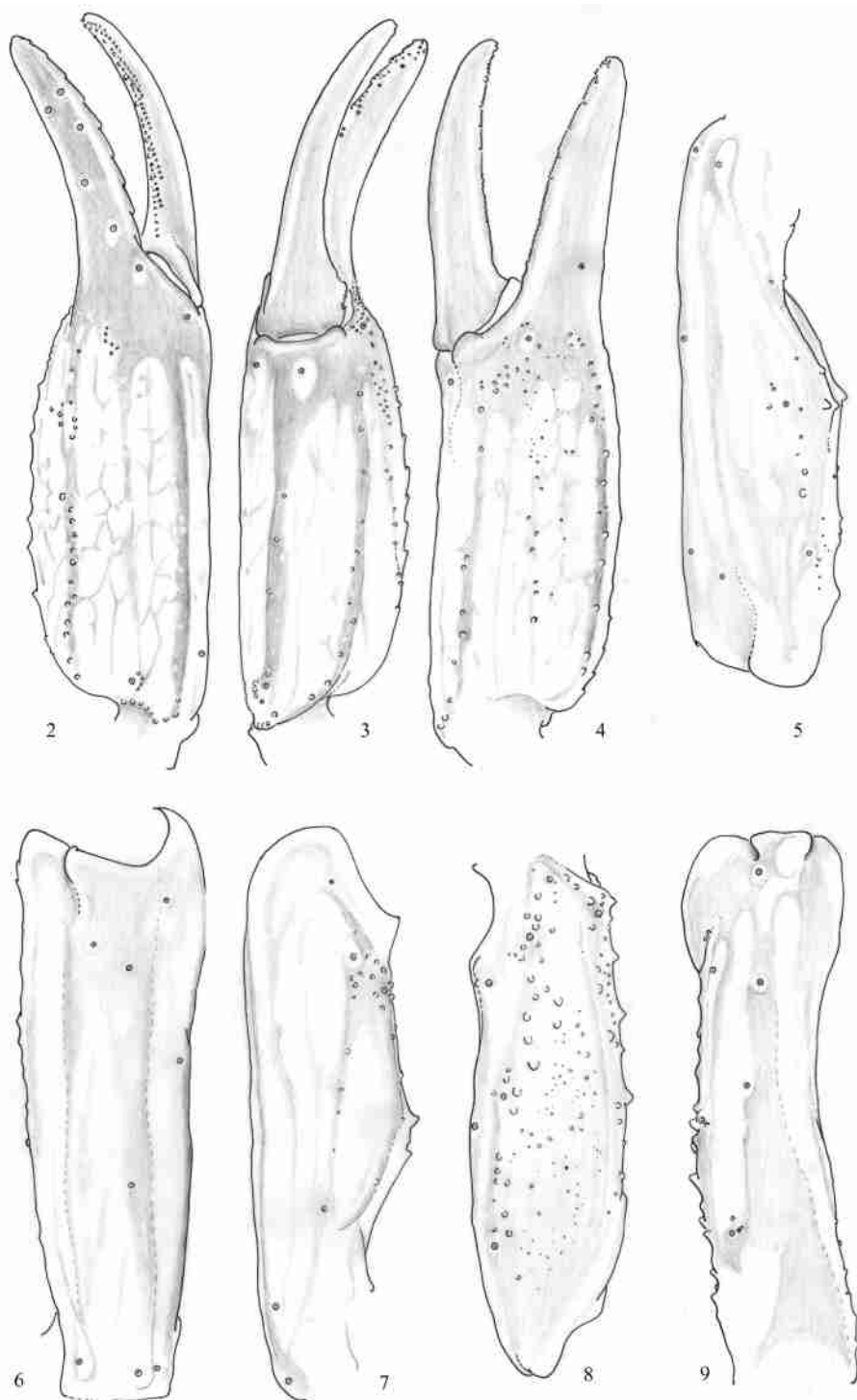
Fig 1. *Chaerilus petzelkai* Kováčik, 2000. Male, habitus.

Dalat, II/1939 (C. Dawydoff), 2 females. Material deposited in the MNHN. One male and one female also deposited in the MHBU.

Diagnosis. Species of moderate to small size in relation to the other species of the genus with 20 to 22 mm in total length. Carapace with the anterior margin weakly concave in males and straight in females, almost acarinate; weakly granular in males, more densely granular in females; furrows moderately to weakly deep. Metasomal carinae moderately granular in males, moderately to strongly granular in females; ventral carinae absent from segment I in males, vestigial in females. Dentate margins of fixed and movable fingers of pedipalp chela with 8-9 rows of granules. Pectinal tooth count 4 in males, 3 in females. Genital operculum plates sub oval.

Coloration. The specimens are only weakly faded in ethanol, and a darker variegated pigmentation can still be observed on body and appendages, better marked in females. Basically reddish yellow to reddish brown. Carapace and tergites reddish yellow, intensely marked with brownish spots.

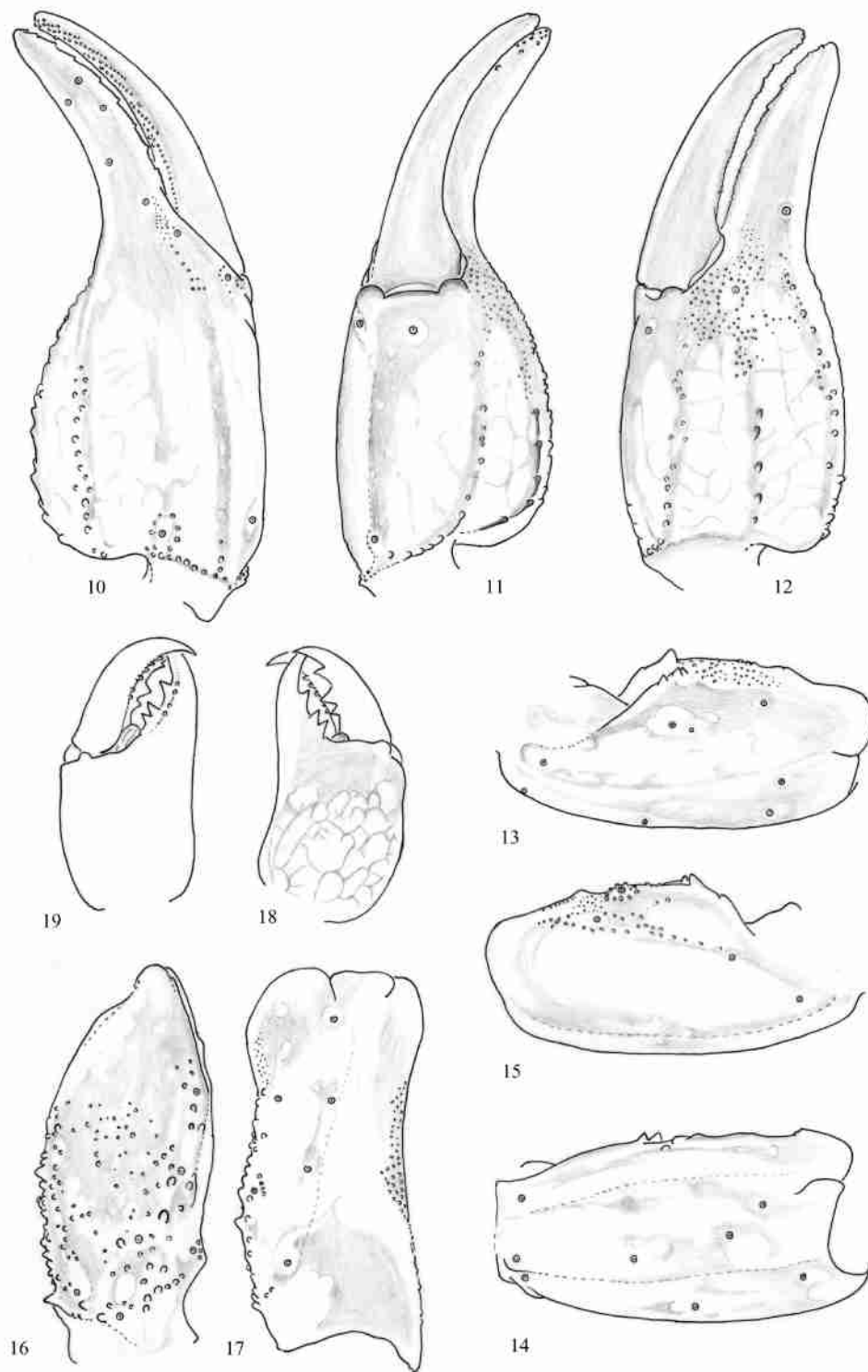
Metasomal segments reddish yellow with variegated brownish spots; carinae dark reddish brown. Telson reddish yellow with brownish spots; aculeus reddish. Chelicerae yellowish with variegated spots; fingers with reddish teeth. Pedipalps reddish yellow with darker variegated pigmentation; chela fingers almost blackish, darker in males. Legs yellowish with dark variegated spots. Venter and sternites yellowish; with the exception of the pectines, all other structures intensely covered with brownish spots.



Figs 2-9. *Chaerilus petzelkai* Kováčik, 2000, male, trichobothrial pattern. 2-4. Chela dorso-external, ventral and internal aspects. 5-7. Patella, dorsal, external and ventral aspects. 8-9. Femur, dorsal and external aspects.

Morphology. Carapace with anterior margin weakly concave in males, straight in females, almost acarinate; weakly granular in males, more densely granular in females; furrows moderately to weakly deep. Two pair of lateral eyes, and a pair of moderate median eyes, about twice the size of lateral eyes; median eyes anterior to the centre of the carapace. Tergites with thin but intense granulations in females but nearly smooth in

males. Tergites I to VI with obsolete carinae on posterior margins; tergite VII with two pairs of very weak carinae developed only on posterior portion and better marked in females. Sternum pentagonal, longer than wide; genital operculum plates sub-oval in shape. Pectinal tooth count 4 in males and 3 in females (Table 1). Stermites smooth with spiracles small and round; carinae absent from VII. Metasomal segments I and II



Figs 10-17. *Charilus petzoldi* Kovarik, 2000, female, trichobothrial pattern. 10-12. Chela dorso external, ventral and internal aspects. 13-15. Patella, dorsal, external and ventral aspects. 16-17. Femur, dorsal and external aspect. Figs. 18-19. Male chelicera, dorsal and ventral aspects.

wider than long; III as long as wide in males, wider than long in females; segments IV and V longer than wide. Carinae moderately granular in males, moderately to strongly granular in females; ventral carinae absent from segment I in males, vestigial in females; segment V with five carinae and spinoid granules on ventral surface.

Vesicle smooth, more elongated in males, with a very short aculeus. Pedipalps elongated in males and globular in females; femur with five carinae; dorsal internal and dorsal external moderately granular; ventral internal and ventral external weakly granular. Patella with four carinae; dorsal moderately granular; ventral weakly

granular to smooth. Chela with nine carinae, all moderately granular; ventral median carinae strong; carinae better marked in females. Tegument with a thin granulation and some punctations. Finger almost as long as manus with 8-9 rows of granulations on the dentate margins. Chelicerae characteristic of the family Chaerilidae (Vachon, 1963). Trichobothriotaxy of type B (Vachon, 1974); femur with 9, patella with 14, and chela with 14 trichobothria. Legs with pedal spurs moderately developed. Tarsi with two series of thin setae.

Table 1. Variation in pectinal tooth count in *Chaerilus petzeldkai* and *Chaerilus laoticus* sp. nov.

	<i>Chaerilus petzeldkai</i>		<i>Chaerilus laoticus</i> sp. nov.	
	Male	Female	Male	Female
Number of teeth				
3	0	24	0	0
4	20	2*	0	6
5	0	0	10	2

* Data from Kovář k (2000) .

Chaerilus laoticus sp. nov. (Figs 20-38, 54-57, 62, 63, 66, 67)

Material. Male holotype. Laos (label written as Indochina), Xiang Kuang (1 500 m), I / 1939 (C. Dawydoff leg), 1 male holotype, 4 males, 4 female

Table 2. Morphometric values (in mm) of *Chaerilus petzeldkai*, male and female; *Chaerilus laoticus* sp. nov., male holotype and female paratype; *Chaerilus vietnamicus* sp. nov., female holotype and *Chaerilus variegatus*, female type.

	<i>C. petzeldkai</i>		<i>C. laoticus</i> sp. nov.		<i>C. vietnamicus</i> sp. nov.	<i>C. variegatus</i>
	Male	Female	Male	Female	Female	Female
Total length	21. 5	20. 5	20. 8	18. 9	26. 5	26. 6
Carapace:						
- length	4. 2	4. 0	3. 9	3. 9	4. 7	4. 4
- anterior width	2. 1	2. 0	2. 1	1. 9	2. 7	1. 9
- posterior width	3. 9	4. 2	3. 8	3. 8	4. 7	4. 5
Metasomal segment I :						
- length	1. 4	1. 1	1. 3	1. 1	1. 5	1. 4
- width	2. 3	2. 3	2. 2	2. 1	2. 5	2. 5
Metasomal segment II :						
- length	1. 7	1. 4	1. 6	1. 4	1. 7	1. 6
- width	2. 0	2. 1	1. 9	1. 6	2. 2	2. 2
Metasomal segment III:						
- length	1. 8	1. 6	1. 7	1. 6	2. 0	1. 9
- width	1. 8	1. 9	1. 7	1. 5	2. 0	2. 1
Metasomal segment IV:						
- length	1. 9	1. 8	2. 0	1. 7	2. 2	2. 0
- width	1. 7	1. 7	1. 5	1. 4	1. 9	1. 8
Metasomal segment V :						
- length	3. 6	3. 2	3. 4	2. 9	4. 0	3. 6
- width	1. 7	1. 6	1. 5	1. 4	1. 8	1. 7
- depth	1. 6	1. 4	1. 3	1. 3	1. 5	1. 4
Vesicle:						
- width	1. 8	1. 9	1. 8	1. 6	1. 8	1. 8
- depth	1. 5	1. 8	1. 4	1. 4	1. 7	1. 6
Pedipalp:						
- Femur length	4. 5	3. 2	4. 4	3. 1	3. 2	3. 1
- Femur width	1. 4	1. 5	1. 4	1. 3	1. 7	1. 6
- Patella length	5. 0	3. 3	4. 6	3. 2	3. 5	3. 4
- Patella width	1. 4	1. 7	1. 3	1. 4	1. 8	1. 7
- Chela length	8. 9	6. 7	8. 6	6. 5	7. 4	6. 7
- Chela width	2. 1	2. 4	2. 1	2. 5	2. 6	2. 4
- Chela depth	2. 2	2. 5	2. 3	2. 6	3. 2	3. 3
Movable finger:						
- length	4. 3	3. 5	3. 2	3. 1	4. 1	3. 6

paratypes. Type material deposited in the MNHN, Paris. One male and one female paratypes also deposited in the MHBV.

Etymology. The specific name makes reference to Laos, where the new species was collected.

Diagnosis. Species of moderate to small size in relation to the other species of the genus with 19 to 21 mm in total length. Carapace with the anterior margin straight, almost acarinate and weakly granulated in males; with thin intense granulations in females; furrows shallow in males, moderately deep in females. Metasomal carinae moderately marked; ventral carinae vestigial on segment I , weakly marked on segment II. Dentate margins of fixed and movable fingers of pedipalp chela with 7-8 rows of granules. Pectinal tooth count 5 in males, 4 to 5 in females (Table 1) . Genital operculum plates have a sub-oval shape.

Relationships. By the number of rows in the dentate margins of pedipalp chela fingers, *Chaerilus laoticus* sp. nov. can be associated with *Chaerilus petzeldkai* Kovář k, 2000, described from Vietnam. The two species can, however, be distinguished by the following features: 1) much shorter chela fingers in *C. laoticus* sp. nov. , (Table 2) ; 2) less rows of granules in chela fingers of

C. laoticus sp. nov.; 3) more pectinal tooth in *C. laoticus* sp. nov.; 4) ventral aspect less pigmented in *C. laoticus* sp. nov.

Coloration. Basically yellowish to reddish yellow; specimens are somewhat faded in ethanol, however, a darker variegated pigmentation can still be observed on body and appendages; the pigmentation is better marked in females. Carapace reddish yellow with diffused brownish pigments. Tergites with the same colour and diffused pigmentation of the carapace. Metasoma: all segments reddish yellow with variegated pigmentation; carinae darker. Telson reddish yellow with diffused spots; aculeus yellowish at the base and reddish at the extremity. Chelicerae yellowish with variegated spots; fingers with reddish teeth. Pedipalps: reddish yellow with darker variegated pigmentation; chela fingers dark. Legs yellowish with diffused spots. Venter and sternites yellowish with diffused spots on sternites.

Morphology. Carapace with anterior margin

straight, almost acarinate and weakly granular in males; with thin intense granulations in female; furrows shallow in males, moderately deep in females. Two pair of lateral eyes, and a pair of moderate median eyes, about twice the size of lateral eyes; median eyes anterior to the centre of the carapace. Tergites with only minute granulations in males, more intensely granulated in females; carinae obsolete. Sternum pentagonal, longer than wide; genital operculum plates with a sub-oval shape. Pectinal tooth count 5-5 in male holotype, 4-4 in female paratype (Table 1). Stermites smooth with spiracles small and round; carinae absent from VII Metasomal segments I and II wider than long; III as long as wide in male, longer than wide in female; segments IV and V longer than wide. All the carinae moderately granular; ventral carinae vestigial on I, weakly marked on II; segment V with five carinae and spinoid granules on ventral surface. Vesicle smooth, more globular in females, with a short aculeus.

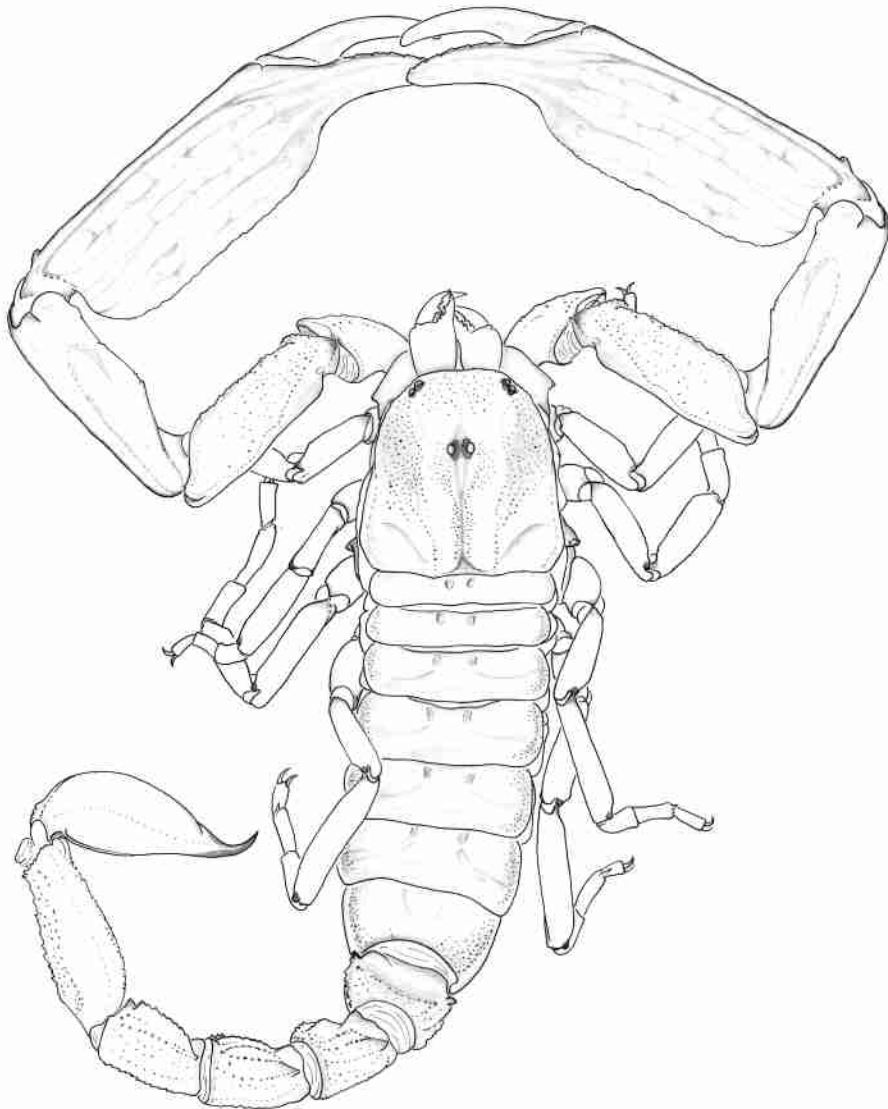
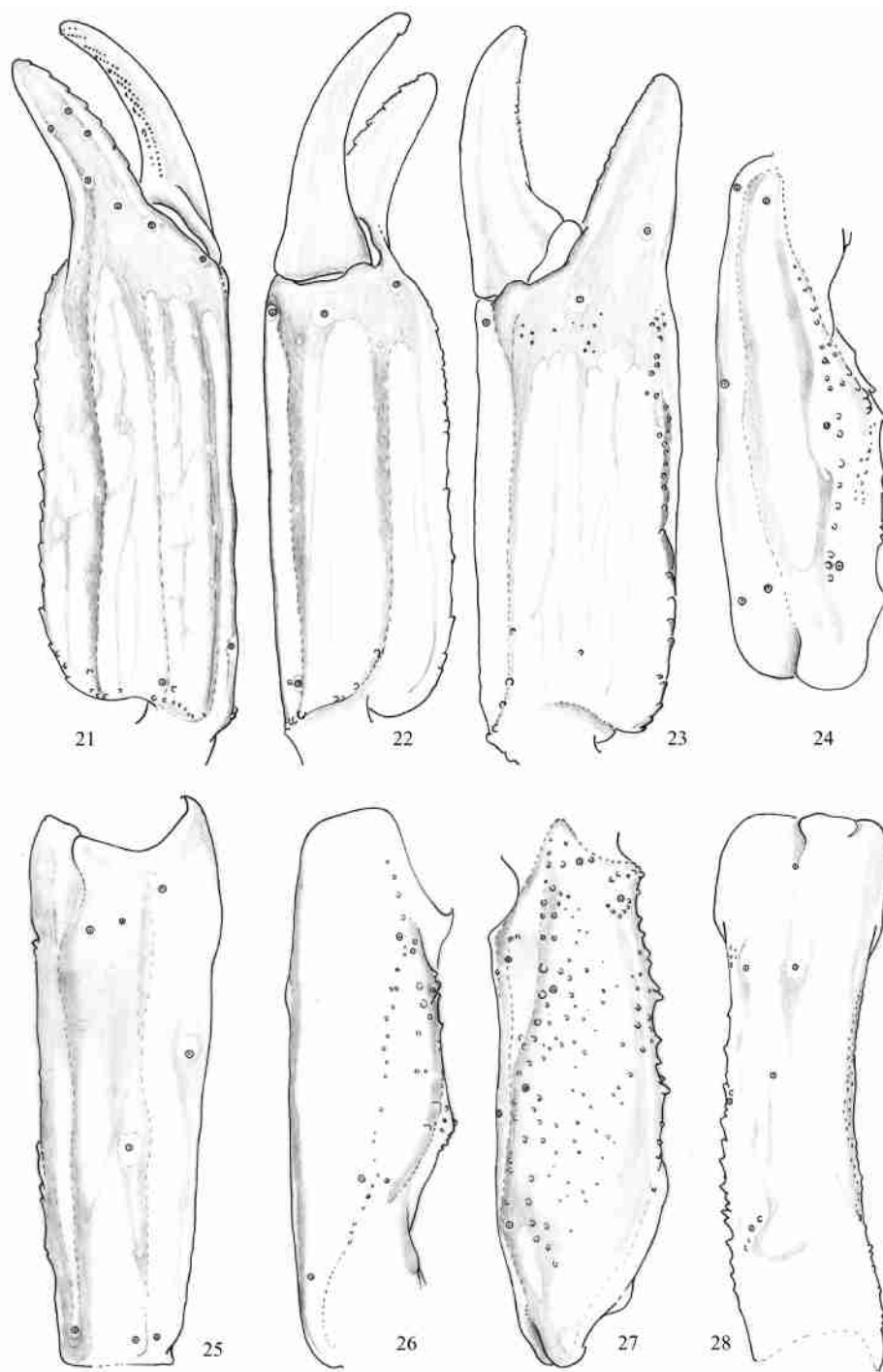


Fig 20. *Chaerilus laoticus* sp. nov. Male holotype, habitus.



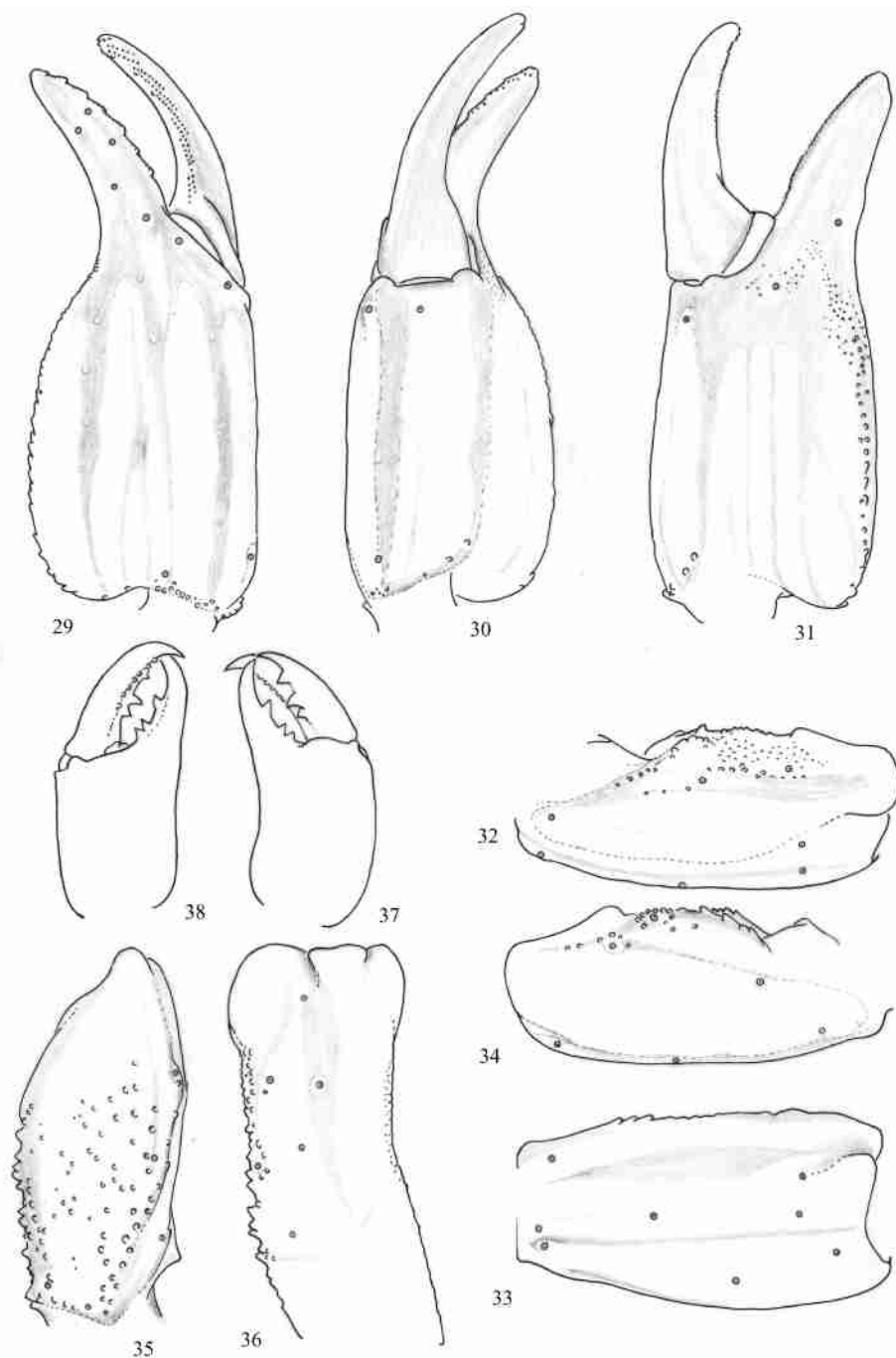
Figs 21-28. *Chaerilus laotius* sp. nov., male holotype, trichobothrial pattern. 21-23. Chela dorsø external, ventral and internal aspects. 24-26. Patella, dorsal, external and ventral aspects. 27-28. Femur, dorsal and external aspects.

Pedipalps. Femur with five carinae; dorsal internal and dorsal external moderately granular; ventral internal and ventral external weakly granular. Patella with four carinae; dorsal and ventral weakly granular to smooth. Chela with 7-8 carinae, all moderately to weakly granular; ventral median carinae moderate. Tegument with very few granulations almost smooth. Finger shorter than manus with 7-8 rows of granulations on the dentate margins. Chelicerae characteristic of the family Chaerilidae (Vachon, 1963). Trichobothriotaxy of type

B (Vachon, 1974); femur with 9, patella with 14, and chela with 14 trichobothria. Legs with pedal spurs moderately developed. Tarsi with two rows of thin setae.

Chaerilus vietnamicus sp. nov. (Figs. 39-49, 58, 59, 68)

Material. Female holotype: Vietnam, Lao Cai, Hong Ha (Red) River at the border with China (Hekou), 1960 (collector unknown). Deposited in the MHBV.



Figs 29-36. *Chaerilus laotianus* sp. nov., female paratype, trichobothrial pattern. 29-31. Chela dorso-external, ventral and internal aspects. 32-34. Patella, dorsal, external and ventral aspects. 35-36. Femur, dorsal and external aspects. Figs 37-38. Male holotype, chelicera, dorsal and ventral aspects.

Etymology. The specific name makes reference to Vietnam, where the new species was collected.

Diagnosis. Species with moderate to small size in relation to the other species of the genus with 26.5 mm in total length. Carapace with the anterior margin weakly concave, almost acarinate and weakly granulated; furrows deep. Metasomal carinae moderately to weakly marked; ventral carinae vestigial or totally absent. Dentate margins of fixed and movable fingers of pedipalp chela with 14 to 15 rows of granules. Pectinal tooth count

5-4. Genital operculum plates sub-triangular in shape. Female holotype, habitus.

Relationships. By the number of rows in the dentate margins of pedipalp chela fingers, *Chaerilus vietnamicus* sp. nov. can be associated with *Chaerilus variegatus* Simon, 1877, described from Java. The two species can be distinguished by the following features: 1) the anterior margin of the carapace is weakly concaved and broad in the new species, whereas in *C. variegatus* it is straight and narrow (Table 2); moreover in the new species

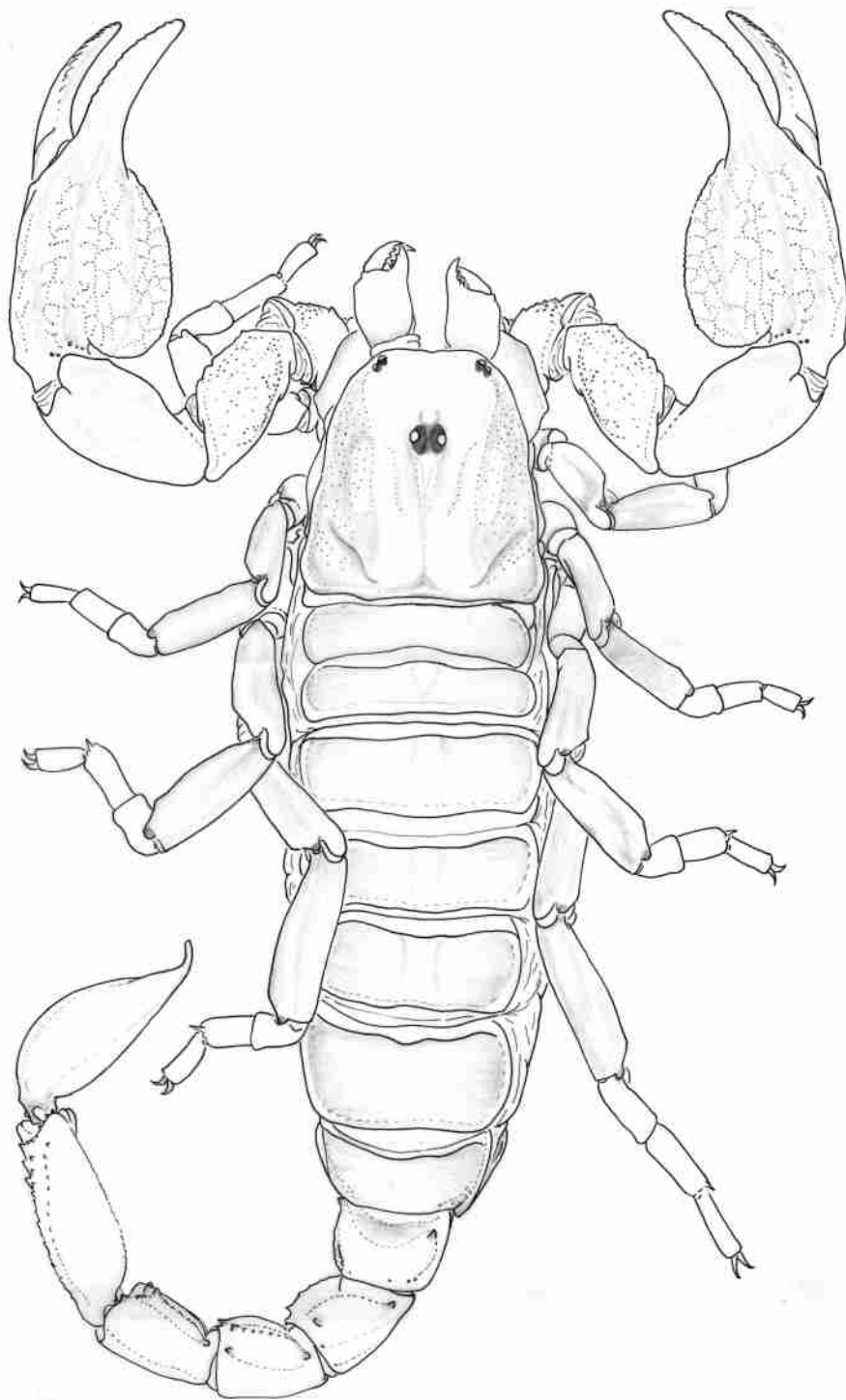
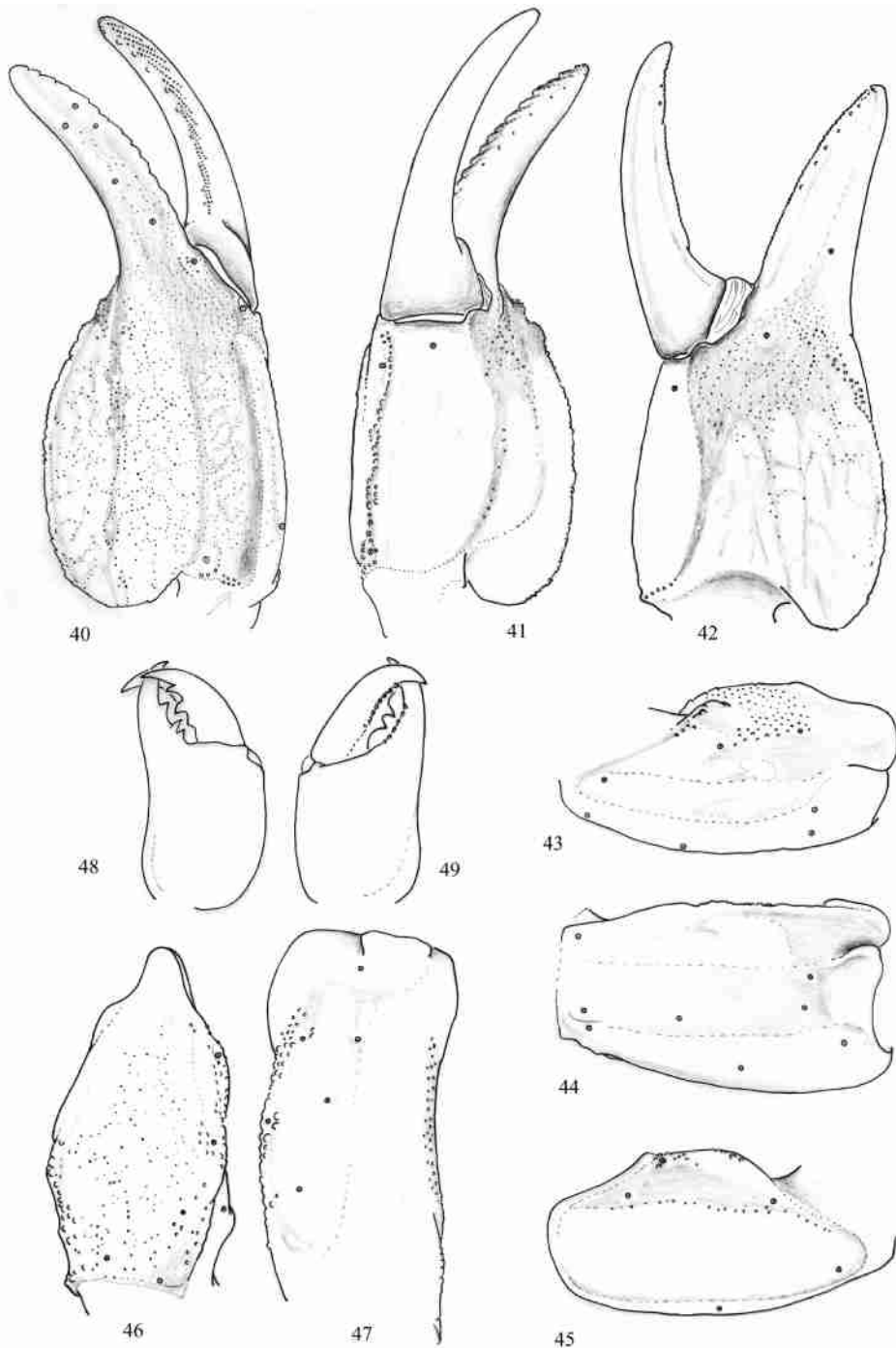


Fig 39. *Chaerilus vietnamius* sp. nov. Female holotype, habitus.

longitudinal carinae are absent and furrows are deep; 2) metasomal carinae are weakly marked in the new species; ventral and latero-ventral carinae absent from segments I and II, vestigial on III and IV; 3) genital operculum plates have a sub-triangular shape in the new species, whereas in *C. variegatus* they are oval to round.

Coloration. Basically yellowish to reddish yellow; the specimen is faded in ethanol, however, a darker variegated pigmentation can still be observed on carapace

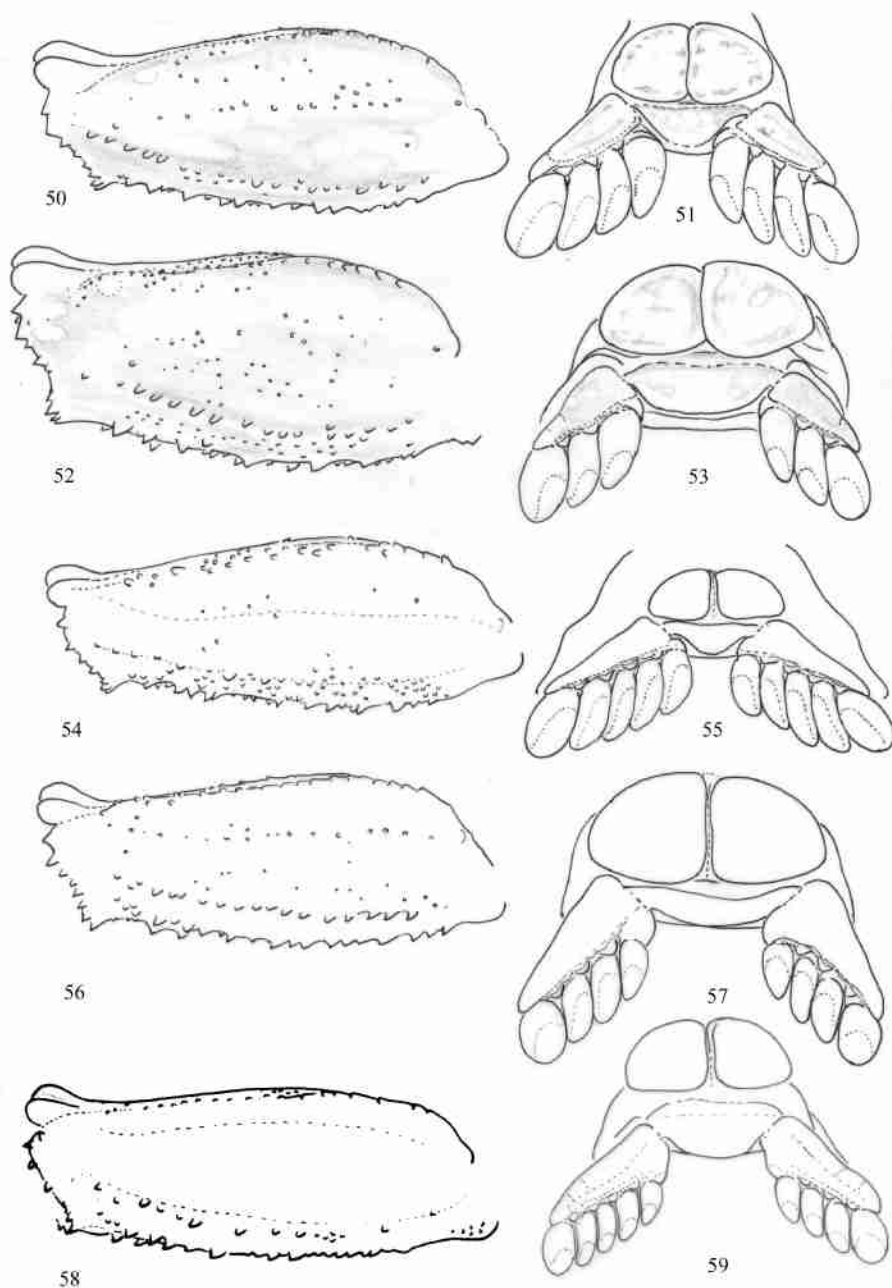
and pedipalps. Carapace reddish yellow. Tergites with the same colour, but paler than carapace. All metasomal segments reddish yellow; carinae dark reddish. Telson reddish yellow with aculeus reddish at the base and yellowish at the extremity. Chelicerae yellowish without any visible variegated spots; fingers with reddish teeth. Pedipalps: reddish yellow with darker variegated pigmentation. Legs yellowish without any visible spots. Venter and sternites yellowish.



Figs 40-49. *Chaenilus vietnamicus* sp. nov., female holotype, trichobothrial pattern. 40-42. Chela dorsal external, ventral and internal aspects. 43-45. Patella, dorsal, external and ventral aspects. 46-47. Femur, dorsal and external aspects. 48-49. Chelicera, dorsal and ventral aspects.

Morphology. Carapace with anterior margin weakly concave, almost acarinate and weakly granular; furrow deep and distinct. Two pair of lateral eyes, and a pair of moderate median eyes, twice the size of lateral eyes; median eyes anterior to the centre of the carapace. Tergites with only minute granulations, almost smooth. Tergites I to VI with obsolete carinae on posterior margins; tergite VII with two pairs of very weak carinae developed only on posterior portion. Sternum

pentagonal, longer than wide; genital operculum plates with a sub-triangular shape. Pectinal tooth count 5-4. Sternites smooth with spiracles small and round; carinae absent from VII. Metasomal segments I and II wider than long; III as long as wide; segments IV and V longer than wide. Dorsal and latero-dorsal carinae present on segments I to IV, moderately granular; ventral and latero-ventral carinae absent from segments I and II, vestigial on III and IV; segment V with five

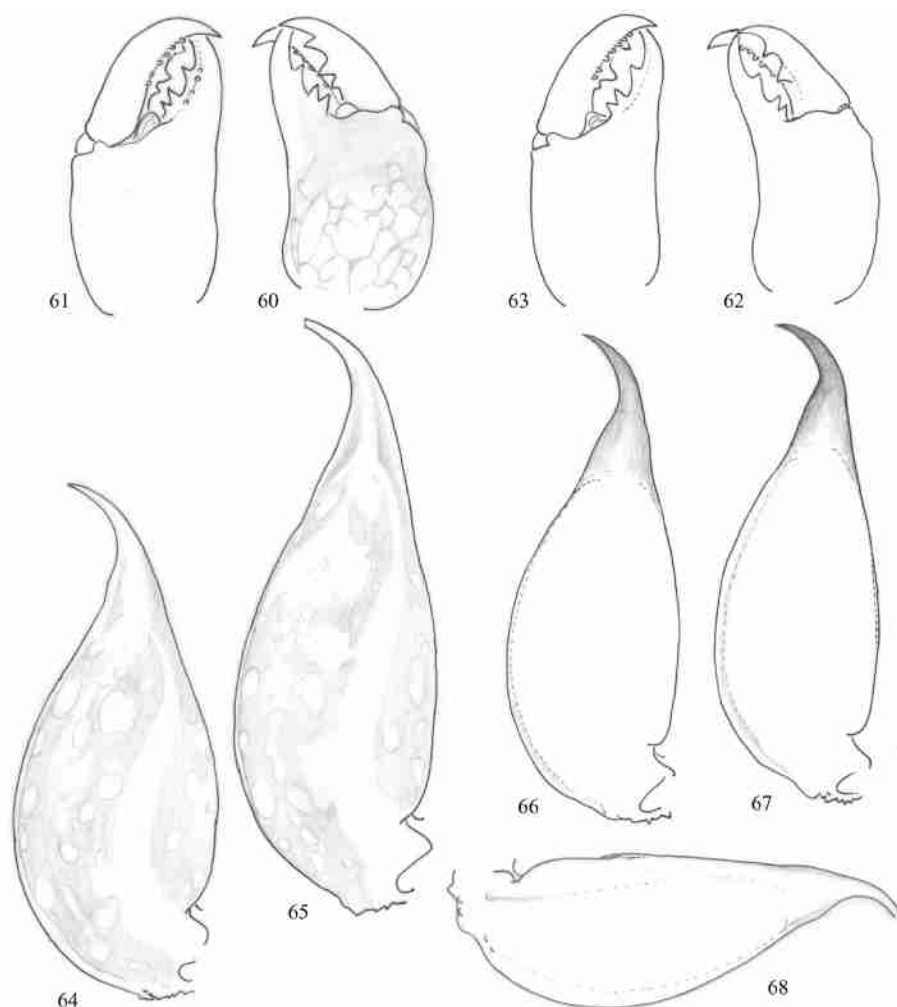


Figs 50-53. *Chaenilus petzelhai* Kováčik, 2000. Figs 54-57. *Chaenilus laotianus* sp. nov. Figs 58-59. *Chaenilus vietnamianus* sp. nov. 50-51, 54-55. Male. 52-53, 56-59. Female. 50, 52, 54, 56, 58. Metasomal segment V, lateral aspect. 51, 53, 55, 57, 59. Genital operculum and pectines.

carinae and spinoid granules on ventral surface. Vesicle smooth, with a very short aculeus. Pedipalps. Femur with five carinae; dorsal internal and dorsal external moderately granular; ventral internal and ventral external weakly granular. Patella with four carinae; dorsal moderately granular; ventral weakly granular to smooth. Chela with nine carinae, all moderately granular; ventral median carinae strong. Tegument with a thin granulation and some punctations. Finger almost as long as manus with 14 to 15 rows of granules on the dentate margins.

Chelicerae characteristic of the family Chaenilidae (Vachon, 1963). Trichobothriotaxy of Type B (Vachon, 1974); femur with 9, patella with 14, and chela with 14 trichobothria. Legs with pedal spurs moderately developed. Tarsi with two series of thin setae.

Acknowledgements We are very grateful to Dr. Victor Fet, Marshall University for reviewing the manuscript.



Figs 60-61, 64-65. *Chaerilus petzelkai* Kováčik, 2000. Figs 62-63, 66-67. *Chaerilus laotianus* sp. nov. Figs 68. *Chaerilus vietnamicus* sp. nov. 60-63, 64, 66, 68. Female. 65, 67. Male. 60-63. Chelicera, dorsal and ventral aspects. 64-68. Telson, lateral aspect.

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老挝和越南豚蝎属二新种 (蝎目, 豚蝎科)

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摘要 描述了产于老挝北部和越南北部的豚蝎属 2 新种: 老挝豚蝎 *Chaerilus laoticus* sp. nov. 和越南豚蝎 *Chaerilus vietnamicus* sp. nov.。为比较, 根据保存在法国自然历史博物馆的系列标本, 重新描述和图示了产于越南南部的佩氏豚蝎 *Chaerilus petrzhkai* Kováčik, 2000。

老挝豚蝎, 新种 *Chaerilus laoticus* **sp. nov.** (图 20~38, 54~57, 62, 63, 66, 67)

正模 ♂, 副模: 4 ♂♂, 4 ♀♀, 老挝库安县 (Xiang Kuang, 1500 m), 1939 年 1 月, C. Dawydoff 采。模式标本保存在法国自然历史博物馆, 1 ♂和 1 ♀保存在河北大学博物馆。

体长 19~21 mm。身体基色为浅黄至浅红黄色。背甲前缘平直, 雄蝎几乎无脊和具弱的颗粒, 雌蝎具稀疏而强的颗粒; 雄蝎背沟浅, 雌蝎背沟适度深。后体脊较显著; 节 I 腹

脊退化, 节 II 腹脊较显著。触肢螯的可动指和固定指齿缘具 7~8 排斜齿。雄蝎栉板具 5 个栉齿, 雌蝎栉板具 4~5 个栉齿。生殖板亚卵圆形。听毛模式 B 型。

词源: 新种的种名以模式标本的采集地而拟定。

越南豚蝎, 新种 *Chaerilus vietnamicus* **sp. nov.** (图 39~49, 58, 59, 68)

正模 ♀, 越南老街红河 (接近中国河口边界), 1960 年, 采集者不详。保存在河北大学博物馆。

体长 26.5 mm。身体基色为浅黄至浅红黄色。背甲前缘稍凹入, 几乎无脊和具弱的颗粒; 背沟深。后体脊适度到较显著, 腹脊退化或缺。触肢螯的可动指和固定指齿缘具 14~15 排斜齿。栉板具 4~5 个栉齿。生殖板亚三角形。听毛模式 B 型。

词源: 新种的种名以模式标本的采集地而拟定。

关键词 蝎目, 豚蝎科, 豚蝎属, 新种, 老挝, 越南。

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